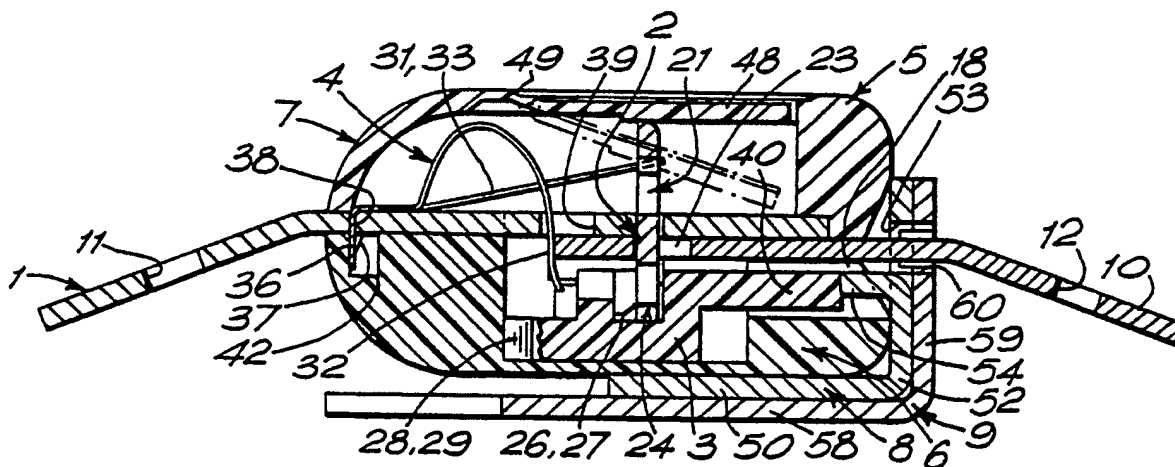




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(54) Title: BUCKLE



(57) Abstract

The buckle has a body (7) into which a tongue (10) can be inserted to be locked in the body by a lockplate (2). Movement of the lockplate (2) to its locking position is prevented by an inhibitor (3), unless the tongue (10) is inserted in the body (7) after two supplementary connecting members (8, 9) have first been threaded onto the tongue (10). Upon such insertion, the inhibitor (3) is contacted by a tab (54) on one of the supplementary connecting members (8) to move the inhibitor (3) and free the lockplate (2) for movement to its locking position. When, but not before, the tongue (10) and supplementary connecting members (8, 9) have been locked together, a further connecting member (15) can be locked onto the body (7). The buckle can be used in a harness and can then be arranged so that all 'obligatory' harness straps must be first secured together before any 'optional' strap can be secured.

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- 1 -

BUCKLEDescription

1 This invention relates to buckles which lock
together more than two parts. Buckles according to the
invention are particularly suitable for use in safety
harnesses, for example safety harnesses of child's
5 safety seats for use in motor vehicles.

 The present invention aims to improve the
operational safety of the buckles to which it relates
and provides a buckle comprising a body and a tongue
insertable into the body, the body having latch means
10 operable to engage the inserted tongue to lock the body
and tongue together and the buckle including at least
one further member positionable relative to the tongue
and body such that it becomes secured to at least one
of these when they are locked together, the buckle also
15 including latch-inhibiting means having a first
condition in which operation of the latch means is
prevented and a second condition in which such operation
takes place, the inhibiting means being responsive to
the presence of the further member so as to adopt its
20 second condition when the further member is in its
said position and to adopt its first condition in the
absence of the further member.

- 2 -

With such a buckle, the latch-inhibiting means functions to prevent the tongue and body being locked together without the further member also being locked to the tongue and/or the body. The buckle can
5 be used in a safety harness, in which respective straps of the harness are connected to the body, the tongue and the further member. These straps may be, for example, a crotch strap, one shoulder strap and the other shoulder strap of the safety harness of a child's
10 safety seat and an important safety feature is provided by the buckle of the invention. Such a safety feature is required by safety regulations governing the sale of child safety seats in certain countries, the regulations requiring, for example, that the buckle can
15 only be fastened when certain "obligatory" straps of the harness are present for connection.

Advantageously, the buckle therefore includes another further member which is securable to the parts mentioned above and which must also be positioned
20 correctly relative to the other buckle parts for the latch-inhibiting means to allow operation of the latch means.

In a preferred harness arrangement, respective lap straps of the harness are attached to the body and
25 the tongue and respective shoulder straps of the harness are attached to the two further members mentioned above. In such an arrangement, fewer than all four harness straps cannot be secured to one another by the buckle.

Preferably, the latch means comprises a latch
30 member which is mounted in the body for movement between positions in which it is respectively disengaged from and engaged with the tongue. In some

- 3 -

embodiments, the latch member is movable rectilinearly in directions substantially perpendicular to the path of movement of the tongue.

Conveniently, the latch-inhibiting means
5 comprises a blocking member which is movable between first and second positions, corresponding to the first and second conditions, in which it respectively blocks movement of the latch member from its disengaged to its engaged positions and allows such movement to take
10 place. When the latch member moves rectilinearly as mentioned above, the blocking member preferably moves substantially parallel to the path of the tongue.

Advantageously, the latch member is acted upon by resilient biasing means which urge the latch
15 member into engagement with the blocking member when the blocking member is in its first position. With such an arrangement, movement of the blocking member to its second position will result in movement of the latch member to its engaged position under influence of the
20 resilient biasing means. Preferably, the engagement between the latch and blocking members takes place at ramped surfaces which serve to allow the latch member to move progressively towards its engaged position during movement of the blocking member to its second position.
25 In buckles having these features, the latch member will be returned to its disengaged position by manual movement against the resilient bias of an operating member acting on the latch member and operable from the outside of the buckle body.

30 In preferred embodiments of the invention, the further member is shaped to engage the blocking member as the further member is moved to its securement position and, in this way, the blocking member is moved

- 4 -

from its first to its second position. Preferably, this movement of the blocking member takes place against a resilient bias which is conveniently provided by integral resilient portions of the blocking member engaging the buckle body. The blocking member in such
5 embodiments is preferably a one-piece plastics moulding.

For engagement with the blocking member, the further member conveniently has a protruding formation which is received in an appropriately-positioned
10 aperture in the buckle body.

Advantageously, securement of the further member to the other buckle parts is achieved by insertion of the free end of the tongue through an opening in the further member which is then retained on
15 the tongue.

With such an arrangement and when the further member is shaped to engage the blocking member in the way mentioned above, the aperture in the buckle body is conveniently positioned adjacent an aperture through
20 which the tongue is inserted and, upon such insertion, a portion of the further member engages the blocking member through the aperture. To prevent movement of the further member relative to the tongue in the direction opposite to the direction of insertion,
25 the tongue and further member may have respective abutment surfaces.

Advantageously, a buckle according to the present invention includes secondary latch means which are operable to lock a secondary strap-attachment
30 member to the buckle body and/or one or more said further members, the secondary latch means having first and second conditions in which locking is respectively prevented and able to take place, the

- 5 -

secondary latch means being responsive to the primary latch means and adopting its first and second conditions when the primary latch means is respectively disengaged from and engaged with the said tongue.

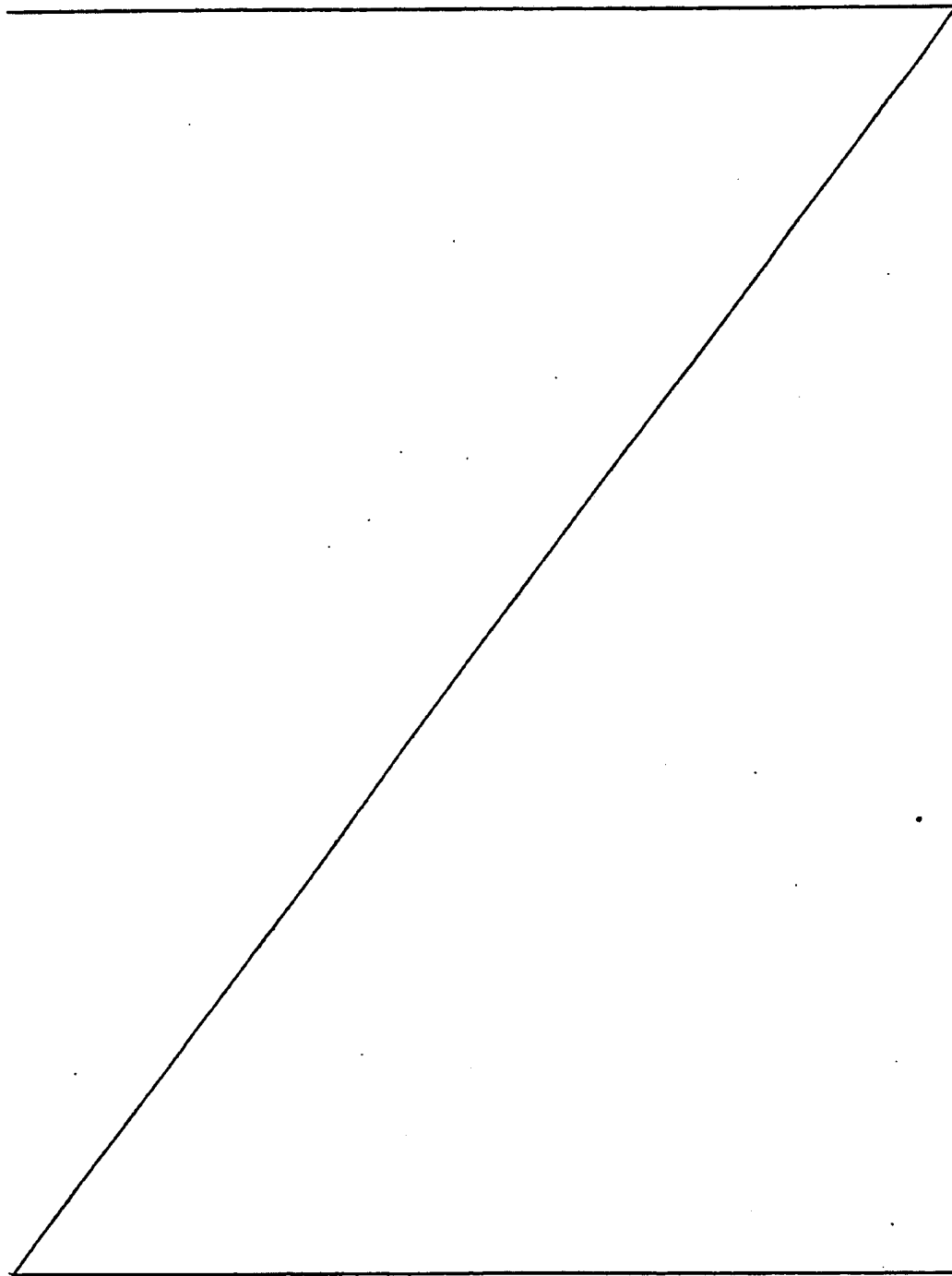
5 In a buckle having this feature, a harness strap attached to the secondary strap-attachment member can only be locked to the buckle after the tongue and the or each said further member have been locked together. This feature enables the buckle to comply with certain
10 safety regulations which require that designated "optional" harness straps cannot be secured to the harness buckle until all "obligatory" straps have been fastened.

 When the primary latch means comprises the
15 latch member mentioned above, the secondary latch means may comprise a portion of the latch member which is engageable with the secondary strap-attachment member only when the latch member is in its engaged position. For example, the secondary latch means may comprise
20 co-operating formations on the latch member and the secondary strap-attachment member which is insertable through an appropriately-positioned aperture in the buckle body, the latch member, when moving to its engaged position, moving to a position in which the
25 secondary strap-attachment member, when inserted through the aperture, contacts the latch member and engagement of the co-operating formations takes place.

 When the resilient biasing means mentioned above acts on the latch member, the latch member, in its
30 engaged position, may move against the resilient biasing means to allow locking of the secondary strap-attachment member to take place, such movement of the latch member being insufficient to cause disengagement

- 6 -

of it from the tongue to take place. With buckles of this construction, both the primary and the secondary latch means will be released by movement of the above-mentioned operating member.



- 7 -

Two embodiments of the invention will now be described by way of example with reference to the drawings, of which:

Figure 1 is a plan view of the main
5 components of a first buckle,

Figure 2 is a side view, mostly in longitudinal section, of most parts of the buckle of Figure 1,

Figure 3 is an exploded perspective view of
10 some parts of the buckle of Figures 1 and 2, and

Figure 4 is a plan view of the main components of a second buckle.

In the following description, terms such as "upper" and "lower" refer to the orientation of the
15 buckle shown in Figure 2. This is for ease of description only and the buckle can of course be used in any orientation.

As shown in Figure 1, the first buckle has a body 7, a tongue 10, a first supplementary connecting
20 member 8, a second supplementary connecting member 9 and a crotch strap connecting member 15. These parts are shown in Figure 1 orientated ready for connection together.

From here on, the end of the body 7 which is
25 on the right in Figure 1 will be referred to as the "forward" or "front" end. The terms "rearward" and "rear" should be construed accordingly.

Referring now to Figures 1, 2 and 3, the body 7 will be seen to comprise a frame 1, a lockplate 2,
30 an inhibitor 3, a spring 4 and upper and lower half-bodies 5, 6. These latter and the inhibitor 3 are moulded from plastics material, whilst the frame 1, lockplate 2 and spring 4, together with the two

- 8 -

supplementary connecting members 8, 9 and the tongue 10 are of steel. The buckle is intended to be used in the harness of a child's safety seat and, for such an application, the frame 1 and tongue 10 have elongate slots 11, 12 through which the lap straps of the harness are looped and secured to themselves by stitching. In a similar manner, the supplementary connecting members 8, 9 have openings 13, 14 for the shoulder straps of the harness. Likewise, the crotch strap connecting member 15 has an opening 16 for attachment of the crotch strap. The slot 12 is formed in a wider portion 70 of the tongue which narrows by way of shoulders 71 at each side to an insertion portion 72.

As can be best seen in Figure 3 of the drawings, the frame 1 has four tabs 17 which are arranged in opposed pairs at respective sides of the plate and which first bend down from the main plane of the plate and then extend inwardly parallel to the plane of the frame to form guide surfaces 18 between which and guide portions 19 of the frame 1 the tongue 10 is slidable upon insertion into and removal from the body part 7. The shape of the lockplate 2 is also best seen from Figure 3 from which it will be clear that the tabs of the pair of tabs 17 and the guide portions 19 are spaced-apart to form a transverse slot 20 in which the lockplate 2 is guided to move in a plane substantially perpendicular to that in which the tongue 10 moves into and out of the frame 1. The lockplate 2 has a central aperture 21 through which the tongue extends when the tongue is received in the body. The aperture 21 is generally rectangular and has on its lower edge a central locking portion 22 which engages in a rectangular aperture 23 in the insertion portion

- 9 -

72 of the tongue 10 in the locked condition of the buckle.

The inhibitor 3 is also shown in Figures 2 and 3 and it will be seen that this moulding of plastics material has a central transverse slot 24 in which the lockplate 2 is received. The rear wall of the slot 24 has two forwardly-projecting lockplate-retaining portions which have ramped lower surfaces 26, 27 which can engage the lower edge of the lockplate aperture 21 at respective sides of the locking portion 22. At its rear end, the inhibitor 3 has a pair of outwardly-extending resilient integral spring portions 28, 29 which engage the lower half-body 6 and urge the inhibitor 30 forwardly in the body 7. In the forward position of the inhibitor 3, the ramped surfaces 26, 27 extend over the lower edge of the lockplate aperture 21 and prevent the lockplate from moving upwardly in the body 7.

The spring 4 is shown in Figures 2 and 3. It will be seen that it has a spine 30 and three resilient tines 31, 32 and 33, the central one 32 of which is longer than the outer two and curls downwardly to pass through an opening 39 in the centre of the rear guide portion 19 of the frame 1 to form an ejector spring for ejection of the tongue 10 from the body 7. The spine 30 has a longitudinal flange 36 which has locking tabs 37 on it and engages in a slot 38 adjacent the rear of the frame 1, the tabs 37 engaging under the frame to retain the spring. The outer tines 31, 33 extend upwardly from the spine 30 and engage in recesses 34, 35 in the upper corners of the lockplate aperture 20 and urge the lockplate 2 upwardly in the body 7. When the inhibitor 3 is in its forward position, this upward movement of the lockplate 2 is prevented by engagement of the ramped surfaces 26, 27 on the lower

- 10 -

edges of the aperture 20.

The lower half-body 6 is a moulding of plastics material and has a hollow interior in the rear corners of which the spring portions 28, 29 of the inhibitor 3 are located. The lower half-body also has respective slots 46 in its side walls for reception of the lockplate 2, a recess 41 in its forward edge for the tongue 10 and a slot 42 for the flange 36 of the spring 4 in the upper surface of its rear wall. A central portion 45 of the recess 41 is of increased depth and accommodates a forwardly-extending operating portion 40 of the inhibitor 3. A further recess 44 in one side wall of the lower half-body 6 can receive a tongue portion 68 of the crotch strap connecting member 15 (see Figure 1).

The upper half-body 5 is also a moulding of plastics material and secured to the lower half-body 6 by integrally-moulded latches (not shown) on the two half-bodies, the frame 1 being secured to the lower half-body by similar latches (also not shown). In its upper surface, the upper half-body has an operating button 48. The operating button 48 is hinged to the upper half-body 5 by an integral hinge portion 49 extending along the rear edge of the button 48. The lower surface of the operating button 48 abuts the upper edge of the lockplate 2 when the lockplate is in its upper position in which the locking portion 22 engages the aperture 23 of the tongue 10, depression of the operating button 48 from this position into the interior of the upper half-body 5 causes downward movement of the lockplate 2 against the bias of the spring 4. This downward movement of the operating button 48 will therefore release the lockplate locking portion 22 from the aperture 23 in the tongue

- 11 -

10 and the central tine 32 of the spring 4 acting on the leading edge of the tongue 10 will eject the tongue 10 from the body 7.

The supplementary connecting members 8, 9 are shown in Figures 1 and 2 of the drawings and it will be seen that the first member 8 has a main flat part 50 containing the aperture 13 and, along one edge, an upstanding flange 52 which has in it a slot 53 through which the tongue 10 can pass. The flange 52 also carries a projecting tab 54 which is dimensioned to be received in the deeper central portion 45 of the recess 41 and to abut the forward end of the operating portion 40 of the inhibitor 3 when the first supplementary connecting member is correctly assembled with the body 7. The second supplementary connector member 9 has a main flat part 58 containing the aperture 14 and also an upstanding flange 59, also having a slot 60 through which the tongue 10 can pass.

The crotch strap connecting member 15 has a tongue portion 68 which can be inserted through the aperture formed in the side body 7 by the recess 44. The tongue portion 68 of the connecting member 15 has an opening 66 in which a hook portion 67 at one side of the lockplate 2 engages when the tongue portion 60 is inserted through the side-wall opening. Upon such insertion, abutment of the tongue portion 65 upon an inclined upper surface 69 of the lockplate hook portion 67 causes the lockplate to move downwardly and thus allow the tongue 68 to pass over the portion 67 and the hook to engage in the opening 66. Such downward movement of the lockplate is not sufficient to cause disengagement of its locking portion 22 from the aperture 23 in the tongue 10.

- 12 -

The operation of the first buckle when used in connecting together the lap, shoulder and crotch straps of a safety harness will now be described. It is assumed that the buckle is in an out-of-use condition in which the harness straps are unconnected and the lockplate 2 is held in its lower position by the inhibitor 3. The tongue 10 is now threaded through the slots 53, 60 in the supplementary connecting members 8, 9, movement of the supplementary connecting members towards the wider tongue portion 70 being prevented by abutment of the flange 59 on the second supplementary member 9 against the shoulders 71 on the tongue and by abutment of the flange 52 of the first supplementary member 8 against the flange 59 of the second member 9. The insertion portion 72 of the tongue is then inserted through the opening in the front of the body 7 formed by the recess 41.

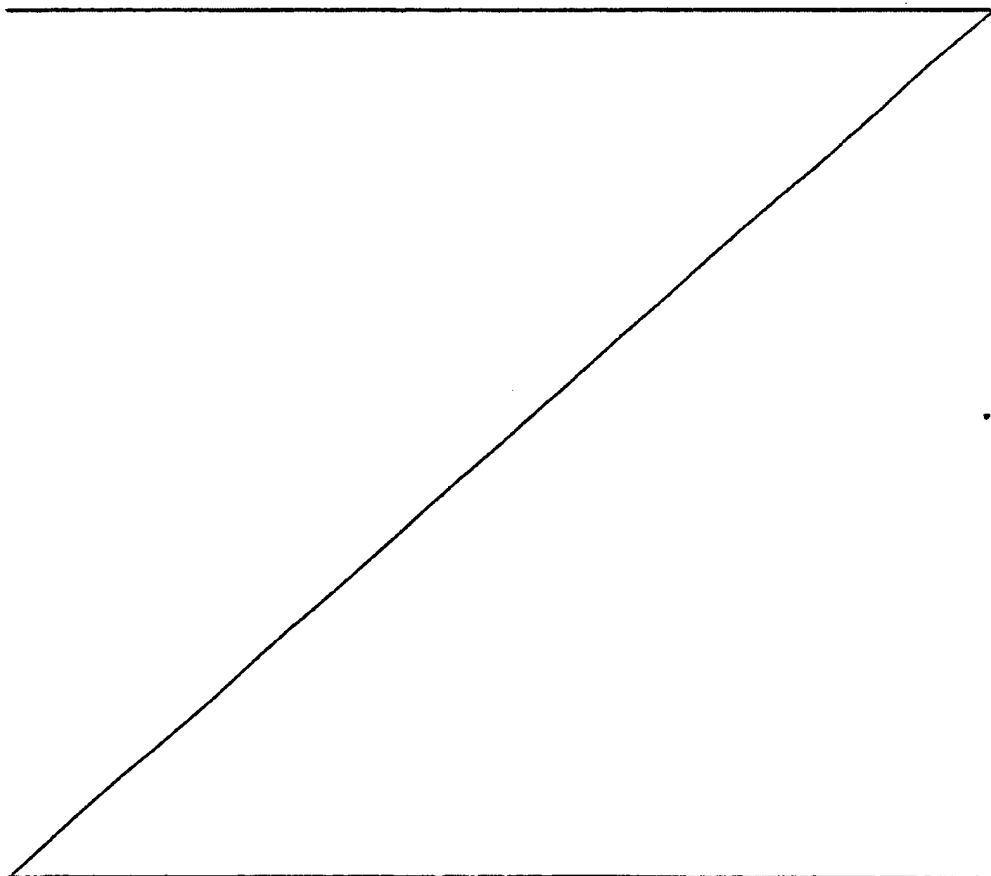
Upon insertion, the insertion portion 72 moves into the slot formed in the frame 1 between the guide surfaces 18 of the tabs 17 and the guide portions 19 of the frame and, during insertion, the projecting tab 54 on the first supplementary connecting member 8 moves into the aperture formed by the deeper recess portion 45 and contacts the operating portion 40 of the inhibitor 3. Such contact causes rearward movement of the inhibitor 3 against the bias of its spring portions 28, 29 and, as a consequence, the lockplate 2 is allowed to move progressively upwards under the action of the outer tines 31, 33 of the spring 4 by virtue of sliding movement of the ramped surfaces 26, 27 on the lower surfaces of the aperture 20. When the lockplate 2 has been released from the inhibitor 3, it will be continued to be urged upwards in the slot 24 and its central locking portion 22 will become

- 13 -

engaged in the aperture 23 in the tongue 10. Further upward movement under the influence of the spring 4 results in the locking portion 22 becoming held in the slot 20 between the guide portions 19 of the frame 1.

5 The tongue 10 is thus locked in the body.

So that the presence of the second supplementary connecting member 9 is essential for the buckle parts to become locked together, the length of the tab 54 is chosen such that an attempt to lock the
10 body 7, tongue 10 and first supplementary connecting member 8 together would be unsuccessful because insertion of the tongue would be limited by abutment of the leading end of the tongue with the lower half-body 6 before sufficient rearward movement of the inhibitor
15 3 for release of the lockplate 2 had taken place.



- 14 -

When it is desired to release the tongue from the body, the operating button 48 of the half-body 5 is depressed and the lockplate 2 consequently moved downwards into its locking portion 22 is freed from the aperture 23. The tongue 10 is now disengaged from the body 7 and the central line 32 of the spring 4 acts on the inner end of the tongue 10 to eject the tongue from the body. During the final stage of the lockplate's downward movement, the inhibitor is moved forwards by the restoring force 5 of the spring portions 28, 29 and the retaining portions projecting into the inhibitor slot 24 are urged over the lower edge of the lockplate aperture 21. The lockplate is thus retained in its lower position and the buckle is returned to its out-of-use condition.

After assembly of the tongue 10 and supplementary connecting members 8, 9 to the body 7, the crotch strap connecting member 15 can be inserted through its opening in the side of the body and the opening 66 in its tongue part 68 thus becomes engaged on the hook portion 67 of the lockplate 2. If it is attempted to lock the crotch strap connecting member to the body 7 before the tongue and supplementary members have been locked to the body, locking will not be possible because the lockplate will be held in its lower position by the inhibitor 3 and the hook portion 67 will be below the level of the side opening in the body.

Figure 4 of the drawings shows a second buckle which is suitable for use with a three-strap safety harness. One strap of the harness is a crotch strap 80 which is attached to the buckle body 81. The other two harness straps (not shown) are shoulder straps which are connected through slots 82, 83 in a tongue 84 and a supplementary connecting member 85. The internal construction of the buckle body is identical to that

- 15 -

shown in Figures 1, 2 and 3. The supplementary connecting member 85 has an upstanding flange 86 having in it a slot 87 through which an insertion portion 88 of the tongue 84 can pass until lateral
5 shoulders 90 on the tongue 84 abut the flange 86. The flange 86 also has a projecting tab 89 which is received in an opening in the forward edge of the body 81 to abut an operating portion of the inhibitor inside. Assembly and operation of this second buckle are substantially
10 identical to those of the first buckle except that there is only one supplementary connecting member through which the tongue must pass and that there is no separate crotch strap to fasten.

It will be noted that in both buckles
15 described above, it is not possible to lock the tongue 10 or 84 into the body 7 or 81 without also assembling the supplementary connector member(s) 8, 9 or 82 with the tongue or body. In both buckles, absence of the supplementary connector member(s) 8, 9 or 82 in their
20 correct positions for locking to the tongue and body means that the inhibitor 3 prevents upward movement of the lockplate 2 and locking of the buckle. Consequently, with the first buckle it is not possible to fasten the buckle with fewer than both lap and both shoulder straps
25 connected together and, with the second buckle, the buckle cannot be fastened unless both shoulder straps are connected to the crotch strap. However, the crotch strap of a harness including the first buckle cannot be connected to the buckle body until all three other steps
30 have been connected. Accordingly, if lap and shoulder straps are termed "obligatory" under safety regulations and a crotch strap is termed "optional", both buckles will meet requirements of the regulations that a buckle

- 16 -

cannot be locked with fewer than all the obligatory harness straps being present for connection and that any optional strap of the harness can only be connected after connection of all obligatory straps.

5 It should also be noted that the lockplate of both buckles moves from its lower position to its upper, locking position only when the aperture in the buckle tongue is positioned to receive the locking portion of the lockplate. Thus, in both buckles, the lockplate
10 moves directly into the tongue aperture without being guided by the tongue or the walls of the aperture. This leads to particularly safe and reliable locking of the buckle and avoids the possibility of the lockplate and tongue becoming jammed together without proper
15 latching having taken place.

- 17 -

CLAIMS

1. A buckle comprising a body and a tongue insertable into the body, the body having latch means operable to engage the inserted tongue to lock the body and tongue together and the buckle including at least one further member positionable relative to the tongue and body such that it becomes secured to at least one of these when they are locked together, the buckle also including latch-inhibiting means having a first condition in which operation of the latch means is prevented and a second condition in which such operation takes place, the inhibiting means being responsive to the presence of the further member so as to adopt its second condition when the further member is in its said position and to adopt its first condition in the absence of the further member.

2. A buckle according to claim 1, in which the latch means comprises a latch member which is mounted in the body for movement between positions in which it is respectively disengaged from and engaged with the tongue.

3. A buckle according to claim 2, in which the latch member is movable rectilinearly in directions substantially perpendicular to the path of movement of the tongue.

4. A buckle according to claim 2, in which the latch-inhibiting means comprises a blocking member which is movable between first and second positions, corresponding to the first and second conditions, in which it respectively blocks movement of the latch member from its disengaged to its engaged positions and allows such movement to take place.

- 18 -

5. A buckle according to claim 3, in which the latch-inhibiting means comprises a blocking member which is movable between first and second positions, corresponding to the first and second conditions, in which it respectively blocks movement of the latch member from its disengaged to its engaged positions and allows such movement to take place, the blocking member moving substantially parallel to the path of movement of the tongue.

6. A buckle according to claim 4 or 5, in which the further member is shaped to engage the blocking member as the further member is moved to its securement position the blocking member being thus moved from its first to its second position.

7. A buckle according to claim 6, in which the movement of the blocking member takes place against the bias of resilient biasing means acting on the blocking member.

8. A buckle according to claim 7, in which resilient biasing means acting on the blocking member comprise integral resilient portions of the blocking member engaging the body.

9. A buckle according to claim 6, 7 or 8, in which the said further member has a protruding formation which engages the blocking member through an aperture in the body.

10. A buckle according to claim 9, in which the aperture in the body is positioned adjacent an aperture through which the tongue is inserted into the body.

11. A buckle according to claim 4 or 5, in which the latch member is acted upon by resilient biasing means which urge the latch member into engagement with the blocking member when the blocking member is in its first position.

- 19 -

12. A buckle according to claim 11, in which the engagement between the latch and blocking members takes place at ramped surfaces which serve to allow the latch member to move progressively towards its engaged position during movement of the blocking member to its second position.

13. A buckle according to claim 12, in which the ramped surfaces are surfaces of the blocking member.

14. A buckle according to any preceding claim, in which the further member has an opening through which the free end of the tongue is inserted to retain the further member on the tongue and to secure it to the other buckle parts.

15. A buckle according to claim 14, in which the tongue and further member have respective surfaces which abut each other to prevent relative movement of the tongue and further member during insertion of the tongue into the body.

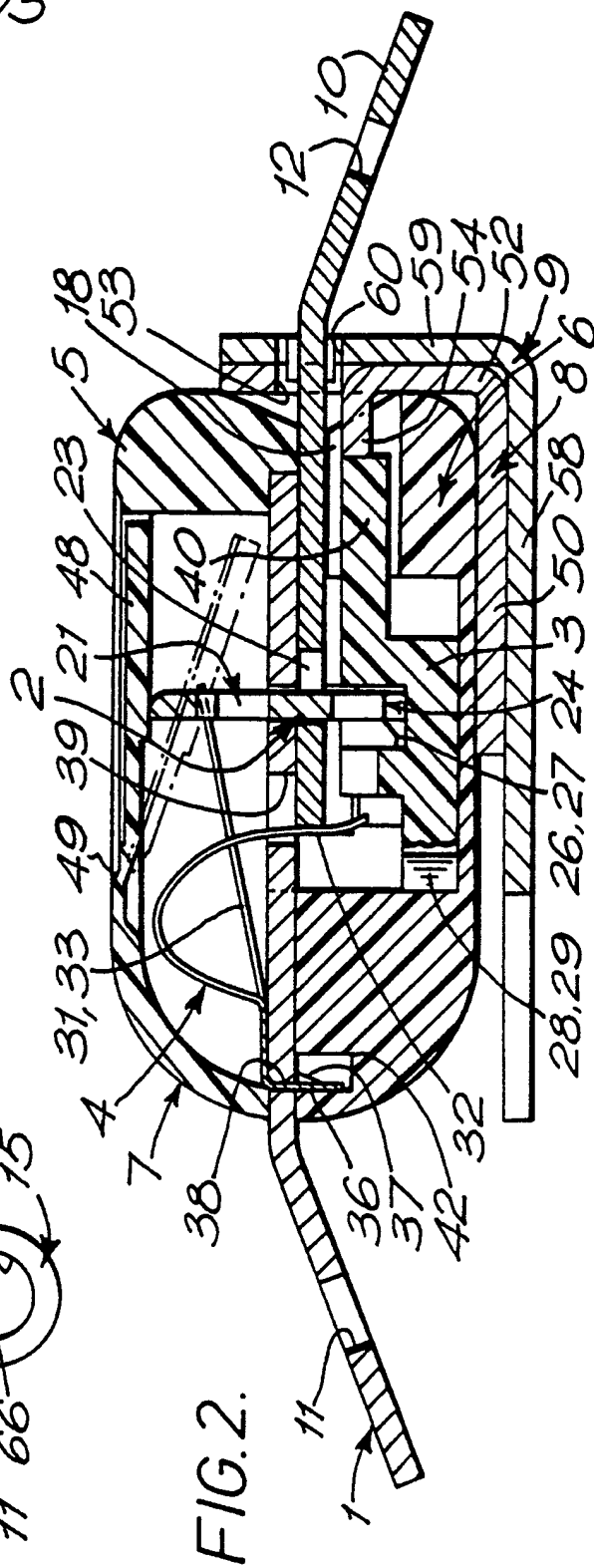
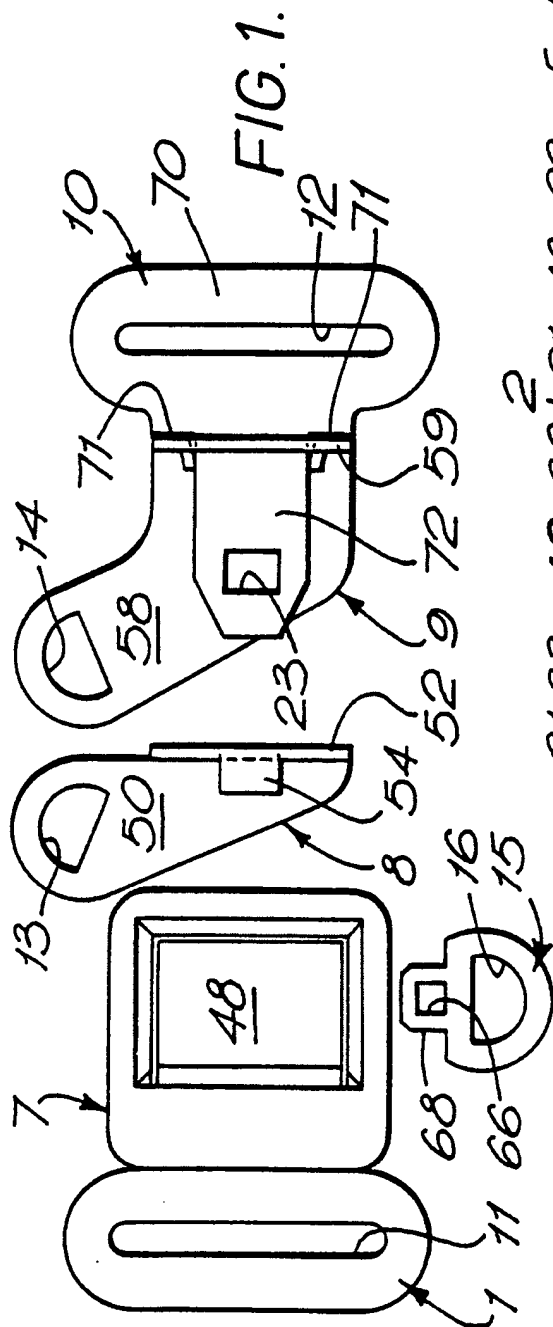
16. A buckle according to any preceding claim, including secondary latch means which are operable to lock a secondary member to the buckle body and/or one or more said further members, the secondary latch means having first and second conditions in which locking is respectively prevented and able to take place, the secondary latch means being responsive to the primary latch means and adopting its first and second conditions when the primary latch means is respectively disengaged from and engaged with the said tongue.

17. A buckle according to claim 16 when dependent from any one of claims 2 to 13, in which the secondary latch means comprises a portion of the latch member which is engageable with the secondary member only when the latch member is in its engaged position.

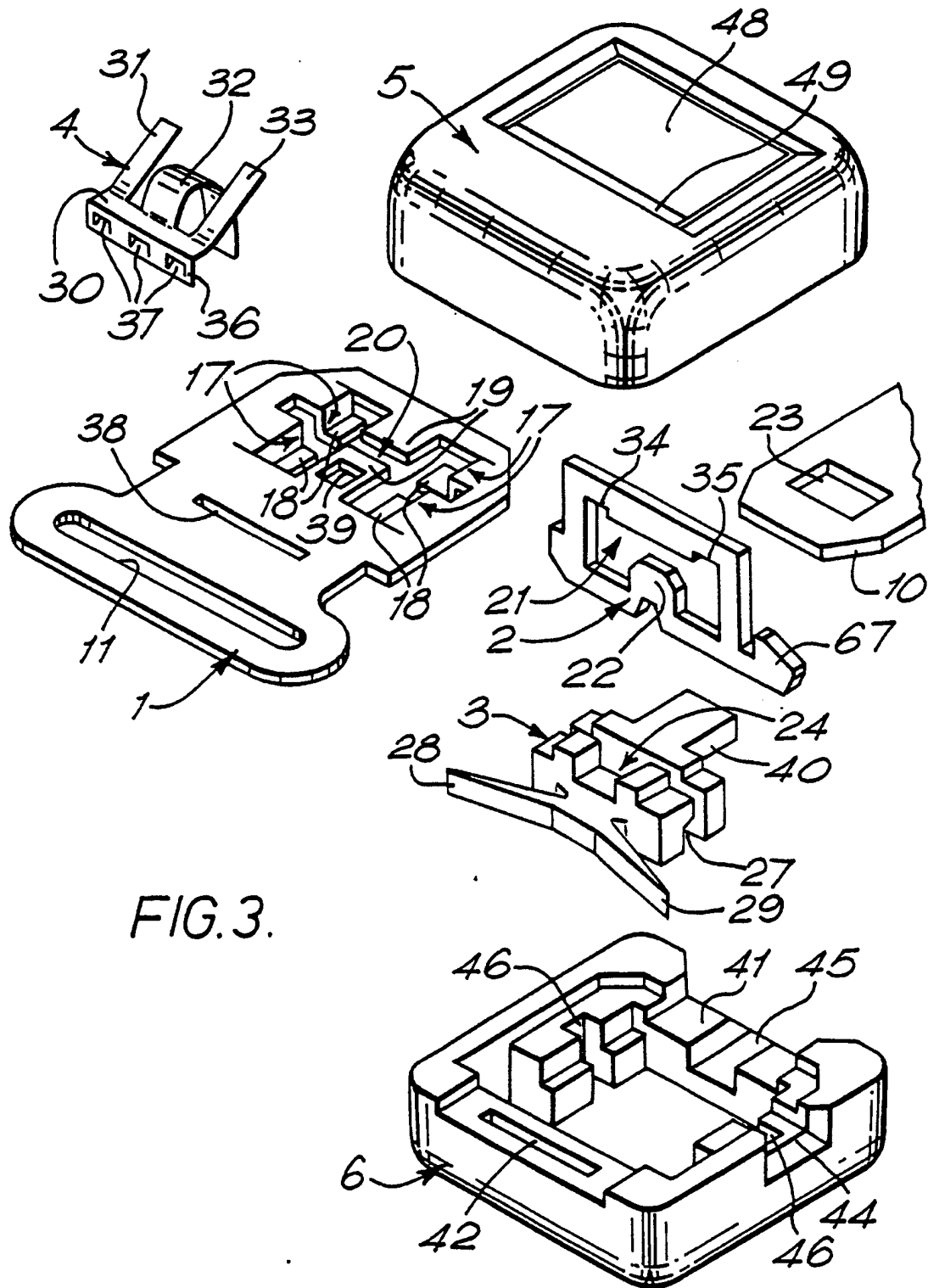
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18. A buckle according to claim 17, in which the secondary latch means comprises co-operating formations on the latch member and the secondary member, the secondary member being insertable through an aperture
5 in the buckle body, and the latch member, when moving to its engaged position, moving to a position in which the secondary strap-attachment member, when inserted through the aperture, contacts the latch member and engagement of the co-operating formations takes place.
- 10 19. A buckle according to any preceding claim, in which the body includes a plate having portions extending from the plane of the plate to form guide surfaces which retain the tongue in a plane parallel to the plate upon insertion into the body.
- 15 20. A buckle according to any of claims 2 to 15, in which the latch member comprise a plate having an aperture through which the tongue passes upon insertion, a wall of the aperture having an inwardly-projecting tab which is engagable with an aperture in the tongue
20 to engage therewith.

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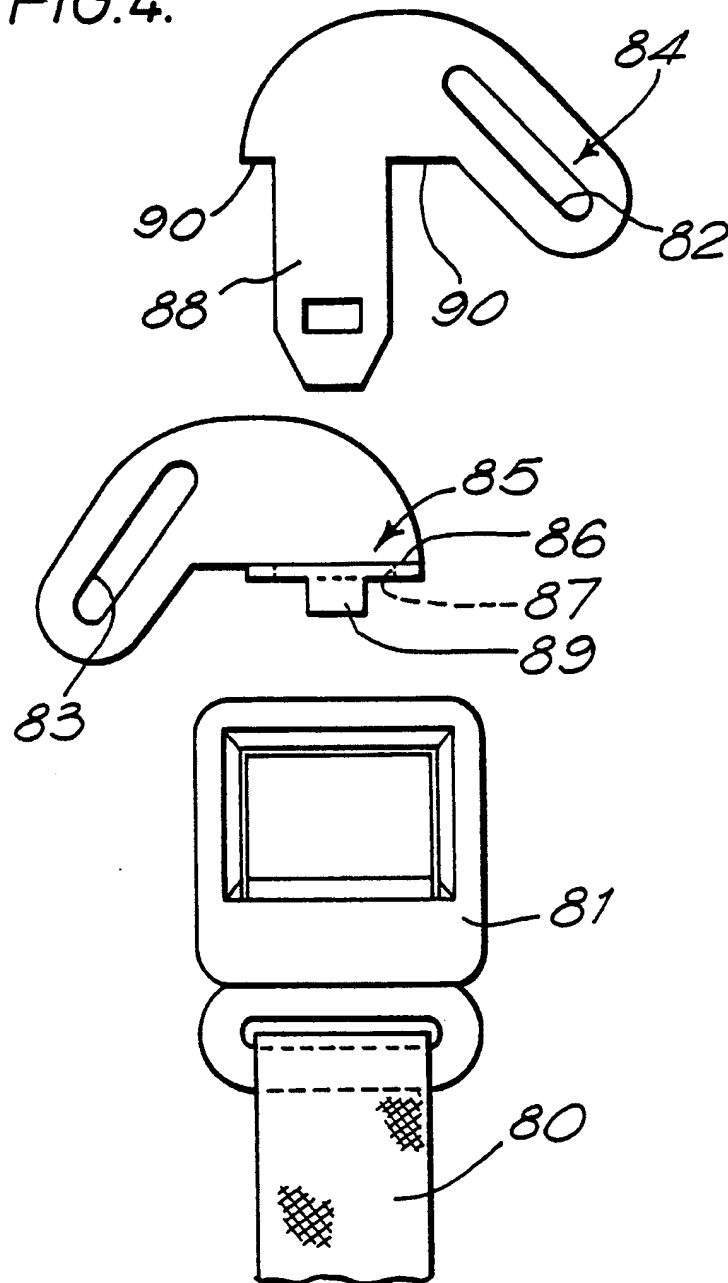


2/3



3/3

FIG.4.



INTERNATIONAL SEARCH REPORT

International Application No. PCT/GB 85/00578

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC IPC ⁴ : A 44 B 11/25																							
II. FIELDS SEARCHED <div style="text-align: center; font-size: small;">Minimum Documentation Searched⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid black; font-size: small;">Classification System</th> <th style="border-bottom: 1px solid black; font-size: small;">Classification Symbols</th> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> IPC⁴ A 44 B B 64 D B 60 R </td> <td style="vertical-align: top; padding: 5px; text-align: center;"> A 47 D </td> </tr> </table> <div style="text-align: center; font-size: x-small; margin-top: 5px;"> Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched * </div>			Classification System	Classification Symbols	IPC ⁴ A 44 B B 64 D B 60 R	A 47 D																	
Classification System	Classification Symbols																						
IPC ⁴ A 44 B B 64 D B 60 R	A 47 D																						
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁸ <table style="width: 100%; border-collapse: collapse; font-size: small;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="border-bottom: 1px solid black;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="border-bottom: 1px solid black;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">DE, U1, 8327221 (VAN RIESEN) 9 February 1984, see claims 1,7-9; page 10, line 16 - page 12, line 19; figures</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,2,6,9,10, 14,15</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">FR, A, 1173348 (ARIEL) 24 February 1959, see the whole document</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-3,16,19</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">FR, A, 1577604 (PACIFIC SCIENTIFIC) 8 August 1969, see page 4, line 18 - page 5, line 11; figures 6,7</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-3,16-19</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">DE, A1, 2651115 (KLIPPAN) 18 May 1978, see page 11, five last lines; page 12, line 1; page 14, last paragraph; page 15, page 16, last paragraph; page 17, paragraph 1; figures 1-4</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-8,11-13, 20</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 4232433 (UEDA et al.) 11 November 1980, see column 5, line 27 - column 9, line 5; figures 6-19</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-8,11-13</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">GB, A, 2098655 (KATSUYAMA KINZOKU) 24 November 1982, see page 2, lines 38-41; page 3, lines 15-24; figures 4-6</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-8,11-13</td> </tr> </table> <div style="font-size: x-small; margin-top: 5px;"> <p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	A	DE, U1, 8327221 (VAN RIESEN) 9 February 1984, see claims 1,7-9; page 10, line 16 - page 12, line 19; figures	1,2,6,9,10, 14,15	A	FR, A, 1173348 (ARIEL) 24 February 1959, see the whole document	1-3,16,19	A	FR, A, 1577604 (PACIFIC SCIENTIFIC) 8 August 1969, see page 4, line 18 - page 5, line 11; figures 6,7	1-3,16-19	A	DE, A1, 2651115 (KLIPPAN) 18 May 1978, see page 11, five last lines; page 12, line 1; page 14, last paragraph; page 15, page 16, last paragraph; page 17, paragraph 1; figures 1-4	1-8,11-13, 20	A	US, A, 4232433 (UEDA et al.) 11 November 1980, see column 5, line 27 - column 9, line 5; figures 6-19	1-8,11-13	A	GB, A, 2098655 (KATSUYAMA KINZOKU) 24 November 1982, see page 2, lines 38-41; page 3, lines 15-24; figures 4-6	1-8,11-13
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IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> Date of the Actual Completion of the International Search 3rd March 1986 </td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> Date of Mailing of the International Search Report 25 MARS 1986 </td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;"> International Searching Authority EUROPEAN PATENT OFFICE </td> <td style="border-bottom: 1px solid black; padding: 5px;"> Signature of Authorized Officer </td> </tr> </table>			Date of the Actual Completion of the International Search 3rd March 1986	Date of Mailing of the International Search Report 25 MARS 1986	International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer 																	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	FR, A, 2398514 (AUTOFLUG) 23 February 1979	
A	FR, A, 2474835 (REPA) 7 August 1981	
A	DE, B1, 2835118 (KOLB) 30 August 1979	
A	GB, A, 2083542 (BRITAX) 24 March 1982	
A	US, A, 3399431 (SHANKLIN et al.) 3 September 1968	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 85/00578 (SA 11674)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 17/03/86

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-U- 8327221		None	
FR-A- 1173348		None	
FR-A- 1577604	08/08/69	US-A- 3520034 GB-A- 1243394 GB-A- 1244710 US-A- 3605207 DE-A- 1782293	14/07/70 18/08/71 02/09/71 20/09/71 20/01/72
DE-A- 2651115	18/05/78	US-A- 4380100	19/04/83
US-A- 4232433	11/11/80	None	
GB-A- 2098655	24/11/82	None	
FR-A- 2398514	23/02/79	GB-A, B 2002444 DE-A- 2733767 JP-A- 54042725	21/02/79 15/02/79 04/04/79
FR-A- 2474835	07/08/81	DE-A- 3004169 JP-A- 56158604 AU-A- 6692581 CA-A- 1159028 US-A- 4428103 AU-B- 538347	13/08/81 07/12/81 13/08/81 20/12/83 31/01/84 09/08/84
DE-B- 2835118	30/08/79	None	
GB-A- 2083542	24/03/82	None	
US-A- 3399431		None	

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